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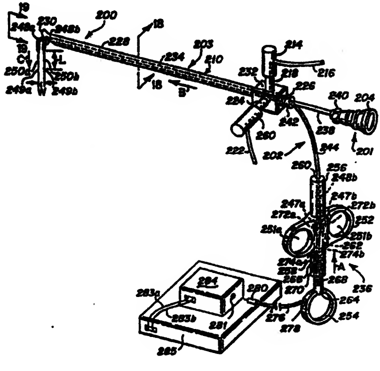
(54) Title: ENDOSCOPIC SURGICAL INSTRUMENT

(57) Abstract

An endoscopic surgical instrument (201) includes a housing (210), a single access conduit (212) formed in the housing (210), an irrigation port, and an evacuation port, each port being connected through independent valves to the single access conduit (212). The single access conduit (212) has a first end and a second end which is terminated in an aperture formed in the housing (210). A closure is provided for the aperture. A viewing device, such as an endoscope, is insertable through the aperture and the single access conduit (212), and is extended slightly beyond the first end. An electrode assembly (202) having two or more retractable RF electrodes spaced a predetermined distance and angle apart, is also insertable through the aperture and the single access conduit (212), and is extendable beyond the first end. Each RF electrode is in electrical communication with a means for supplying RF energy and for continuously measuring impedance across the electrodes.



Specification

ENDOSCOPIC SURGICAL INSTRUMENT

RELATED CASES

This application is a continuation-in-part of my co-pending U.S. Patent Application serial No. 08/025,003, filed March 2, 1993 which is a continuation-in-part of my co-pending U.S. Patent Application Serial No. 07/779,108 filed October 18, 1991.

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to a surgical instrument and more particularly to an instrument with the capability for continuous irrigation and evacuation of fluid into and out from a body cavity of a patient during Laparoscopic or Endoscopic surgical procedures, and for the simultaneous measurement of tissue impedance and the ablation of tissue with fixed or retractable electrodes using R.F. energy.

Brief Description of the Prior Art

Laparoscopic/endoscopic surgical procedure allows a surgeon to see inside the body cavity of a patient without the necessity of large incisions. This reduces the chances of infection and other complications related to large incisions. The endoscope further allows the surgeon to manipulate microsurgical instruments without impeding the surgeon's view of the area under consideration.

During these surgical procedures it is desirable for as few lines as possible to enter the body of the patient. This reduces the size of the incision the surgeon needs to make. It follows from this that the greater the number of functions provided by a single instrument or the greater the number of instruments able to be passed through a single line entering the patient's body, the better.

Furthermore, in certain procedures it may be desirable to irrigate the area under consideration. This in turn necessitates the evacuation of the irrigation fluid or,

moving parts. Similarly if any of the instrumentation is to be reusable, such instrumentation, including the valves, should be capable of being efficiently cleaned by, for example, flushing.

United States Patent 4,668,215 (Allgood) discloses a valve for switching between an evacuation and an irrigation conduit and allowing both such evacuation and irrigation to be done via a single line entering the patient. The mechanism for switching between the irrigation, evacuation and closed configurations is by means of a L-valve or T-valve. This patent, in another embodiment thereof, further provides for a piston valve for making an on-off connection between an evacuation port and the line leading into the patient.

The L- and T-valves have the disadvantage that they must be manipulated by rotation by the surgeon, usually using his/her free hand. The piston valve disclosed in this patent has the disadvantage that it has many areas where blood and tissue accumulation and coagulation can occur which may result in the malfunctioning of the valve. In addition, the piston valve has numerous "dead" areas where fluid flow would not occur. This precludes the device from being effectively cleaned by commonly used flushing techniques. Finally, the Allgood patent does not disclose a single body for housing an evacuation/irrigation control valve together with a housing for laparoscopic and microsurgical instrumentation.

A surgical valve that the applicant is aware of is the piston valve illustrated in Fig. 1 of the accompanying drawings.

In this valve a piston 10 is located within a cylinder 11. The piston 10 can be moved along the bore of the cylinder 11 by means of a plunger 12, from a closed position (as shown) to an open position in which a conduit 13 is aligned with an access port 14. This allows fluid flow along a path to or from access port 14, via conduit 13 and space 16 from or to a further port 15. Upon

monopolar or bipolar radio frequency connector which exits into the access conduit in such a manner so as to make radio frequency connection with a probe received by the probe connector.

Preferably the connector for receiving an end, for convenience called the locating end, of the probe would be in the form of a receiving bore in the access conduit which would include a plurality of O-rings which provide a fluid-tight seal around the locating end of the probe. These O-rings also function to retain the probe in the receiving port while allowing the probe to be rotated. In one embodiment of the invention, the O-rings are, instead of being located within the receiving bore of the access conduit, located about the locating end of the probe.

This invention also provides for a valve, for use as either an evacuation or an irrigation valve, the valve comprising a housing, an activator connected to the housing, at least a first and a second valve access conduit, both of which exit into the housing and a fluid impervious seal mounted within the housing such that activation of the activator causes the first valve conduit to move axially relative to the seal and the second valve conduit such that the seal is disengaged and the conduits are placed in direct fluid communication with each other.

Typically, the instrument of the invention would contain two of the above described valves. One valve would act as an evacuator control while the other valve would act as an irrigation control. Both valves communicate into a single access conduit which, when the instrument is in use, continuously flows into the patient via the receiving bore and the hollow interior of the electrostatic probe.

Preferably the endoscopic surgical instrument of the invention is in the form of a pistol with the "barrel" portion thereof having, at one end thereof, the receiving bore for the locating end of the endoscopic probe and, at the other end thereof, the access port for the microsurgical instruments and endoscopes.

in the art after having read the following detailed description of the preferred embodiment which is illustrated in the several figures of the drawing.

IN THE DRAWINGS

In the following drawings:

FIG. 1 is a partial sectional elevation through a prior art piston valve;

FIG. 2 is a diagrammatic section through a semi-exploded elevation of one embodiment of the endoscopic surgical instrument of the invention;

FIG. 3 is an illustration of a tricuspid valved access port illustrated in plan (a) and elevation (b) views;

FIG. 4 is a section through a receiving bore of the instrument illustrating one way of locating a probe in the bore;

FIG. 5 is a section through a similar receiving bore showing a different way of locating a probe in the bore;

FIG. 6 is a side view illustrating in (a)-(i) various electrostatic probe operational ends;

FIG. 7 is a section through a valve according to the invention with the valve being in the shut position;

FIG. 8 is the valve of FIG. 7 in the open position;

FIG. 9 is a partial section through a different type of valve also suitable for use in the instrument of the invention;

FIGS. 10, 11, 12 and 13 are diagrammatic illustrations showing various configurations of valve operating buttons and triggers;

FIG. 14 is an exploded view of an alternative embodiment of the surgical instrument of the invention illustrating a disposable valve cartridge;

FIG. 15 is a cross section through the disposable valve cartridge illustrated in Fig. 14;

FIG. 16 is a partially sectioned view of another type of valve which can be used in the surgical instrument of the invention;

FIG. 17 is a perspective view of an alternate embodiment of the endoscopic surgical instrument having generally

this is in the form of a R.F. connector. The advantage of a R.F. connector is that it is an industry standard and can be used for connecting the instrument 20 to standard R.F. energy sources marketed by a number of different manufacturers.

The radio frequency connector 29 exits into the access conduit 25 where it makes connection with a point 30, on the locating end 27 of a probe 28 received by the probe connector 26.

The surgical instrument 20 also includes a port 31 which allows the surgeon to insert microsurgical instrumentation and viewing devices along the access conduit 25 and the bore of the hollow probe 28 to exit from the end 32 thereof. The port 31 should provide a fluid-tight seal when no microsurgical instrumentation is being used with the surgical instrument 20. This will prevent fluid, which may be moving along the access conduit 25 to or from the patient, from leaking.

Typically, the access port 31 is in the form of a commercially available tricuspid valve as illustrated in FIGS. 3(a) and (b). In these figures, the valve 31 is shown as being constituted by three segments 32 which in plan view are wedge-shaped and which together form the disc shaped sealing portion of the valve. The segments 32 are held together by means of a circumferential ring 33 which biases the three segments 32 together to form a fluid-tight seal. In use, the microsurgical instrumentation are inserted through the valve at a point 34 where the apexes of the segments 32 come together. This insertion forces the elements of the valve apart to allow ingress of the microsurgical instrumentation. The effect thereof is shown in broken lines in FIG. 3(b). When the instrumentation is removed from the valve 31, the segments 32 are pulled together to form the seal.

In FIG. 4 the probe connector 26 is shown to be constituted by a receiving bore which is coaxial with the fluid access conduit 25. In practice, the diameter of this bore would be the same as that of the access conduit

FIG. 5 further illustrates an alternative positioning of the O-rings 36. In this case they are located on the locating end 27 of the probe 28.

From FIGS. 4 and 5, although not shown, it will be apparent that the diameter of the operational shank 28a of the probe 28 can be variable. Typically, the probe, as shown, would have a diameter of 5mm. This diameter can, however, be increased to 10mm which would be close to the diameter of the locating end 27 of the probe, as well as that of the internal bore diameter of the access conduit 25. The advantage of 10mm diameter probes is that the evacuation of removed tissue and objects such as the gall-stones can be more effectively achieved. Obviously, when the bore of the operating shank 28a of the probe, the locating end 27 and the access conduit 25 are all 10mm in diameter, the diameter of the evacuation port 22 and its related valve 24 and connector tube 24a must also be 10mm.

In FIG. 6(a) to (i), a side view of number of different electrode shapes are illustrated. It will be appreciated that the electrode tips could be either monopolar or bipolar. In the case of bipolar electrodes, only one electrode is illustrated since a second electrode is fully obscured by the visible electrode. These electrode tips would be located on the operating end of the probe 28.

As can be seen from the figure, a number of the tips are not symmetrical about the longitudinal axis of the probe 28. It is for this reason that it is desirable for the probe 28 to be mounted on the instrument in such a manner to allow for a rotation of the probe about its longitudinal axis. As has been previously indicated, this will give the surgeon the opportunity of rotating any non-symmetrical tips, inside the patient, without having to rotate his or her wrist.

This invention extends also to an electrostatic probe 28, substantially as described in any of the FIGS. 4 to 6.

The details of one type of irrigation/evacuation valve are illustrated in FIGS. 7 and 8. The valve 24 indicated in both figures comprises a housing constituted by a

Upon release of the force on the button 51, the bias of the spring 55 will return the valve to its shut position.

It is evident from the construction of the valves illustrated in FIGS. 7 and 8 that they can be readily cleaned by commonly used cleaning such as flushing. In addition, the valves have almost no areas where blood and tissue accumulation and coagulation can occur, and if such accumulation and coagulation does occur the valves cannot be jammed in the open position. This is because the spring biasing the valve into its closed position is located in an effectively sealed area. Furthermore these valves have been tested to a pressure of up to 100 psi without the integrity of the valve seal being adversely affected.

An alternative form of valve, to that illustrated in FIGS. 7 and 8 above, is shown in FIG. 9. In the figure the valve is shown to include a generally cylindrical valve body 60, an activating button 61 and a plunger 62. A hollow bore runs down the center of the valve body 60 and contains the valve seal 63. The valve seal 63 is made up of a circular washer 63a and a sealing O-ring 63b and is screwed onto the bottom of plunger 62. The valve seal 63 is biased into its illustrated sealing position by means of a spring 64 located in the bottom part of the valve body 60.

To open the valve, the button 61 is depressed so that the plunger 62 forces the valve seal 63 downwards against the bias of the spring 64 to a position shown in broken lines 63', in the figure. As a result, a fluid path, indicated by arrows 65, is opened between an upper pair of cutouts 66 and a lower pair of cutouts 67. Each pair of cutouts opens into the hollow bore in the center of the valve body 60 and, when this valve is inserted into the surgical instrument, into either an evacuation or irrigation conduit. Closure of the valve is achieved by releasing the button and allowing the spring 64 to return the valve seal 63 to the sealing position.

button to manipulate the evacuation valve could be concave while the button for manipulating the irrigation valve could be oonvexly shaped.

FIG. 13 illustrates still another arrangement of buttons and valves, in this case an arrangement particularly suited to the valve shown in FIG. 9.

In this figure only the pistol grip 90 of the surgical instrument of the invention is shown. An irrigation port 92 and evacuation port 94 enter the pistol grip 90 at the bottom of its handle portion. The ports 92, 94 are, in use, respectively connected to irrigation and evacuation conduits (not shown) and, to this end, suitable connectors, as illustrated, are provided.

The irrigation port 93 communicates with the main access conduit 96 (referenced as 25 in FIGS. 2, 4 and 5) along an irrigation conduit 98 which extends from the irrigation port 93 and into the rear of the bore 100 which houses an irrigation valve 102. From there it extends along the bore 100 to a point near the front of the bore from where it exits into the body of the grip 900 to enter rear of the bore 104 which houses an evacuation valve 106. the irrigation conduit extends directly across the bore 104 at this point and becomes a central conduit 108 which communicates with the access conduit.

On the other hand, the evacuation port 94 communicates with an evacuation conduit 105 which extends along the pistol grip 90 directly into the front of the bore 104, down to the bore 104 to its rear from where it exits into the central conduit 108.

In the position shown, both the irrigation and evacuation valves 102, 106 respectively, are shown in the off or shut configurations and neither evacuation or irrigation can take place. Should irrigation of the patient be required, the dish-shaped irrigation button 110 is depressed and the valve 102 opens (ie. its valve seat moves to the right in the drawing) to allow irrigation fluid to pass along the irrigation conduit 98 and into the bore 104. In this bore 104 the evacuation valve 106 is in

of the instrument. When the cartridge 120 is located in the grip 120 the actuators 132 are located directly below a pair of operating triggers 140 which can be used to operate the irrigation/evacuation procedures described before.

Finally, when the cartridge 120 is in place, it is held there by means of a retainer clip 142 which clips in behind the cartridge 120. The retainer clip 142 has apertures 144 formed in it to allow the irrigation and evacuation pipes 128, 130 to pass through it.

Although it will be apparent that the valve types described above are also suitable for use in the cartridge 120, a further valve configuration is illustrated in FIG. 15, which illustrates the cartridge 120 in greater detail.

In this figure, the cartridge 120 is shown to include an irrigation conduit 150 and an evacuation conduit 152, both of which lead to a central access conduit 154 which extends down the center of the male connector 134. Irrigation and evacuation procedures are controlled by irrigation and evacuation valves 156 and 158, respectively.

The irrigation valve 156 consists of a valve seal 160 mounted onto a stem which is screwed into an activator button 132a. A fluid tight seal is provided for the valve 156 by an O-ring 168 mounted onto the cap 132a. The valve seal 160 seals against a valve seat, formed at the junction between the irrigation conduit 150 and the central access conduit 154 and is held in the sealing position (as shown) by a spring 162.

Access to the valve seat is through a hole 164 formed into the top (as shown in the drawing) of the cartridge 120. This hole 164 can be closed off with a cap 166 and allows the irrigation valve 156 to be inserted into the cartridge 120. This is done by inserting the valve seal 160 and its associated stem into the hole 164 from above and inserting the spring 162 from below. Thereafter the cap 132a can be screwed onto the stem to hold the entire valve 156 in place.

a fluid path 194 between an opening 196 formed in the sidewall of the valve body and its lower end. Releasing the button 186 allows the spring 192 to force the seal 184 back into the closed position.

One advantage of this valve is that it is very simple and inexpensive to manufacture and can, therefore, readily be disposed of.

Finally, it will be apparent to anyone skilled in the art, that the surgical instrument of this invention could be made from any suitable material. In the event that the instrument is intended for single use, plastic material could be used. Alternatively, for reusable or reposable instrument, the instrument can be made of a more durable material.

FIG. 17 is a perspective view of an endoscopic surgical instrument 200 which is an alternate embodiment of the surgical instrument 20 described above. FIG. 18 is a partial sectional view of a portion of the instrument 200 taken along the line 18-18 of FIG. 17 and FIG. 19 is another view of the instrument 200 taken as indicated by the line 19-19 of FIG. 17. FIG. 20 illustrates the retractable electrode assembly 202. When viewed together, FIG. 17-20, illustrate the instrument 200 including an endoscopic instrument 201, a retractable RF electrode assembly 202, an continuous irrigation and evacuation assembly 203, a R.F. energy source 285, and a tissue impedance monitoring device 284. It will be appreciated that, although two retractable RF electrodes are illustrated and subsequently described, in alternate embodiments the retractable electrode assembly could have one or more than two retractable RF electrodes. Also, although a bipolar retractable RF electrode assembly is illustrated and subsequently described, it will be appreciated that a monopolar retractable RF electrode assembly could be used.

The assembly 203 includes a housing 210, an irrigation valve assembly 214, and an evacuation valve assembly 220. The housing 210 includes an elongated portion 228 having

device 284, and a R.F. energy source 285. The sheath 248 is generally parallel to the scope sheath 238. The sheath 248 and the sheath 238 are each insertable into an opening of an insert flange 242, into the aperture of the handle portion 232 of the assembly 203. The sheath 248 and the sheath 238 are insertable within the conduit 212 and are each of sufficient length such that when each is fully inserted within the conduit 212, each extends slightly beyond the tip end 230 of the cylindrical portion 228.

The endoscopic instrument or endoscope 201 is substantially similar to the endoscope instrument described above, and can be any of a number of devices known in the prior art. An eyepiece 204 is shown attached to the endoscope 201. The endoscope 201 is slid into the scope sheath 238 until the eyepiece 204 engages a flange 240 which is attached to the sheath 238. Thus, the endoscope 201, and the sheath 248 of the retractable electrode assembly 202 are both insertable within the portion 228 of the irrigation and evacuation assembly 203.

Each of two RF electrodes 250a, 250b is sheathed within its respective guide sheath 248a, 248b. Although the illustrated embodiment depicts two RF electrodes, it will be appreciated that the assembly 202 could have one or more than two electrodes. Each electrode 250a, 250b includes a first or distal end 249a, 249b, a second, or proximal end 247a, 247b, and a central portion (not shown) disposedly connected therebetween. A coating of insulation 246 is disposed onto the bare electrode 250. The insulation coating 246 may be in the form of a tube of material (such as teflon) heat shrunk around the bare electrode 250. Alternately, the insulating coat 246 may be powder deposited, using vacuum deposition techniques, onto the bare electrode 250. In either case, nearly the entire length of the bare electrode 250 is covered by the insulating coat 246.

The electrodes 250a, 250b have a generally constant diameter throughout its entire length and are sized such that they can be slid within the sheaths 248a, 248b. That

Each connecting pin 272a, 272b is in communication with a wire 274a, 274b each of which passes through the plunger 264, through an opening 278, and into an insulated line 276 which is terminated in a plug 280 which is matingly engagable with a receptacle 282 of the tissue impedance measuring device 284. The R.F. source 285 is in electrical communication with the impedance measuring device via electrical lines 283a and 283b. The source 285 and the impedance measuring device 284 are connectable in parallel in order to get realtime impedance measurement of tissue engaged between the first ends 249a, 249b of each of the electrode 250a, 250b.

The movement mechanism 236 includes a finger ring portion 252, and a thumb ring portion 254. The finger ring portion 252 is a generally flat plate having finger loops 251a, 251b formed therein. A passage 262 is formed through the finger ring portion 252 such that the longitudinal axis of the passage 262 is disposed between each finger loop and lies coplanar with the plane of each finger loop. The sleeve 256, and a cylinder 258 are partially inserted into opposite ends of the passage 262. The sleeve 256 has a passage longitudinally formed therein so as to receive the covering 244. The cylinder 258 has a passage longitudinally formed therein which is aligned with the passage of the sleeve. The plunger 264 is slidable within the passage of the cylinder 258. One end of the plunger is attached to the thumb ring portion 254, and the connection pins 272a, 272b are mounted to the other end of the plunger 264. The outer surface of the plunger 264 is visible through an access cutout 270 formed in the cylinder 258. In one embodiment, an indicator post 266 is attached to the outer surface of the plunger 264 and passes through the access cutout 270 to give an immediate visual indication of the position of the plunger 264 within the cylinder 258. In a preferred embodiment, the outer surface of the plunger 264 is scored with a plurality of indicator marks 268 to provide a visual indication of the position of the plunger 264 within the

predetermined extension length L in order to permit the bare electrode to penetrate a tissue portion up to the full L value. Further, the first ends of each needle electrode are separated by a predetermined separation width W (typically 0.1-2.0 cm) and each first end forms a predetermined angle θ with respect to the longitudinal axis of portion 228. In the illustrated embodiment, the angle θ is 90 degrees. Typical values for θ range between 0 and 360 degrees.

During surgical procedures, the tip end 230 of the portion 228 of the instrument 200 is brought adjacent to a target tissue area of the body cavity. The first ends of each electrode are extended beyond their respective sheaths such that each first end is embedded into the soft target tissue area thereby defining a tissue portion engaged between the adjacent first ends of each electrode. The power source is energized and R.F. energy is transmitted from one electrode to the adjacent electrode. The energy transmission causes a coagulation of the tissue portion engaged between the adjacent electrodes and ablation of the target tissue.

Using the present invention, the surgeon can predict and control the amount of tissue ablation/coagulation with greater accuracy and safety. As described above, the spacing between the two parallel first ends of each electrode remains constant at some predetermined W value, e.g. 1.0 cm. Also, the extension of the electrodes beyond the insulators at a given angle, i.e. the depth of penetration of each first ends of each electrode into the soft tissue portion, can be precisely controlled by observing the indicator marks on the plunger. Predictable and precise tissue ablation is therefore possible with the present invention because the depth of each first end of each electrode in soft tissue can be precisely controlled by the surgeon. That is, the surgeon can predict a cylindrical zone of ablation by controlling the depth of the retractable first ends into the soft tissue portion. This precise depth control enables the

highest value the audible signal decreases in frequency. In the present invention, the tissue impedance is monitored or measured on a relative basis. That is, the impedance measured or monitored is the impedance of the tissue engaged between the two needle electrodes.

FIG. 22A through 22H illustrate alternate electrode configurations. It will be noted that the preferred embodiment of the present invention includes two electrodes with a θ of 90 degrees, and a L value of 0-3 cm, and a W value of 0.1-2.0 cm. It will be appreciated that a variety of electrode configurations, with associated L, W, and θ values within the above specified ranges, are possible. However, it is generally preferable to limit the total number of electrodes to six or less.

It will be noted that in the embodiments illustrated in FIG. 22A-22C, 22G-22H, the electrodes 250 are guided by the shape of the sheath 248. That is, the electrodes can be directed towards or away from each other if the guide sheaths are angled towards or away from each other. Similarly, different θ values are possible if the sheaths are formed with the appropriately angled bends.

However, in the embodiments illustrated in FIG. 22D-22F, the sheaths are substantially straight and the electrodes themselves are bent in order to direct them in certain orientations. This feature is more clearly shown in FIG. 23 which illustrates a typical electrode having a bend formed at the location depicted by numeral 257. When the electrode is disposed within the sheath 248, the electrode 250 is in contact with at least one portion 259 of the inner surface of the sheath 248 because of the bend 257. When the electrode is extended beyond the sheath (shown in phantom lines), the electrode "flattens" within the sheath 248 while the electrode tip angles away from the sheath centerline in accordance with the bend 257 formed in the electrode.

FIG. 24 illustrates a retractable electrode surgical instrument 300 which is an alternate embodiment of the retractable electrode instrument 200 (FIG. 17). The

CLAIMS

1. An endoscopic surgical instrument comprising:

a) a housing;

b) a single access conduit being disposed within said housing, and having a proximal end and a distal end;

c) an irrigation port formed in said housing;

d) an evacuation port formed in said housing, each of said irrigation and said evacuation ports being in fluid communication, through independent valves, with said proximal end of said single access conduit;

e) an aperture and a closure therefor, said aperture being formed in said housing, and said closure being openable to allow the ingress of microsurgical instrumentation into said proximal end of said single access conduit; and

f) RF electrode means insertable into said aperture and into said single access conduit and having a length so as to protrude beyond said distal end of said single access conduit, said RF electrode means for engaging a body tissue portion, and for simultaneously ablating said body tissue portion and measuring an impedance value associated with said body tissue portion.

2. An endoscopic surgical instrument as recited in claim 1, wherein said RF electrode means includes:

a) a first RF electrode having a distal end and a proximal end, said first RF electrode being disposed within an insulating sheath;

b) elongated guide means encasing said first RF electrode and said insulating sheath, for guiding said first RF electrode to a predetermined angle value from the longitudinal axis of said single access conduit;

c) electrode movement mechanism means, attached to said proximal end of said first RF electrode, for moving said first RF electrode within said guide means, said distal end of said first RF electrode is extendable beyond an open end of said guide means up to a predetermined

within each of associated guide means, and said distal ends of each of said first RF electrode and said second RF electrode is extendable beyond and retractable within each of said associated guide means, and when each of said distal ends of each RF electrode is extended beyond said associated guide means said energy source means is energized to pass electrical current from one RF electrode to the other and said tissue impedance measurement means measures the impedance of tissue engaged between each of said distal ends of each RF electrode.

4. An endoscopic surgical instrument as recited in claim 3, wherein:

a) said predetermined angle value is greater than 0 degrees and is less than 360 degrees;

b) said second predetermined angle value is greater than 0 degrees and is less than 360 degrees;

c) said predetermined length value is greater than 0 cm and is less than 3 cm;

d) said second predetermined length value is greater than 0 cm and is less than 3 cm; and

e) said predetermined width value is greater than 0.1 cm and is less than 2.0 cm.

5. An endoscopic surgical instrument as recited in claim 3, wherein:

a) said predetermined angle value is equal to said second predetermined angle value; and

b) said predetermined length value is equal to said second predetermined depth value.

6. A retractable RF electrode assembly for ablating and measuring the impedance of a body tissue portion, comprising:

a) a first RF electrode having a distal end and a proximal end, said first RF electrode being disposed within an insulating sheath;

said distal end of said second RF electrode is extendable beyond an open end of said second guide means up to a second predetermined length value so as to be engagable with and insertable into said body tissue portion;

d) said proximal end of said second RF electrode is in electrical communication with said energy source means and said tissue impedance measurement means; and

e) whereby said electrode movement mechanism means moves each of said first RF and said second RF electrodes within each of associated guide means, and said distal ends of each of said first RF electrode and said second RF electrode is extendable beyond and retractable within each of said associated guide means, and when each of said distal ends of each RF electrode is extended beyond said associated guide means said energy source means is energized to pass electrical current from one RF electrode to the other and said tissue impedance measurement means measures the impedance of tissue engaged between each of said distal ends of each RF electrode.

8. A retractable RF electrode assembly as recited in claim 7, wherein:

a) said predetermined angle value is greater than 0 degrees and is less than 360 degrees;

b) said second predetermined angle value is greater than 0 degrees and is less than 360 degrees;

c) said predetermined length value is greater than 0 cm and is less than 3 cm;

d) said second predetermined length value is greater than 0 cm and is less than 3 cm; and

e) said predetermined width value is greater than 0.1 cm and is less than 2.0 cm.

9. A retractable RF electrode assembly as recited in claim 8, wherein:

a) said predetermined angle value is equal to said second predetermined angle value; and

ii) a guide wire disposed within each of said guide means and having a first end attached to each said bellows portion of each of said guide means; and

c) whereby actuating said lever tensions each of said guide wires and varies each of said predetermined and said second predetermined angle value.

14. A retractable RF electrode assembly as recited in claim 6, further including:

a) means for bending said guide means to vary said predetermined angle value.

15. A retractable RF electrode assembly as recited in claim 14, wherein

a) said guide means includes a bendable bellows portion disposed at a distal end of said guide means;

b) said bending means includes

i) a lever attached to said housing;

ii) a guide wire disposed within said guide means and having a first end attached to said bellows portion of said guide means; and

c) whereby actuating said lever tensions said guide wire and varies said predetermined angle value.

16. A retractable RF electrode assembly as recited in claim 7, further including:

a) means for bending each of said guide means for each of said first RF electrode and said second RF electrode to vary each of said predetermined and said second predetermined angle values.

17. A retractable RF electrode assembly as recited in claim 16, wherein

a) each of said guide means for each said first and said second RF electrodes includes a bendable bellows portion disposed at a distal end of each of said guide means;

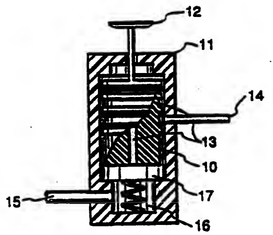

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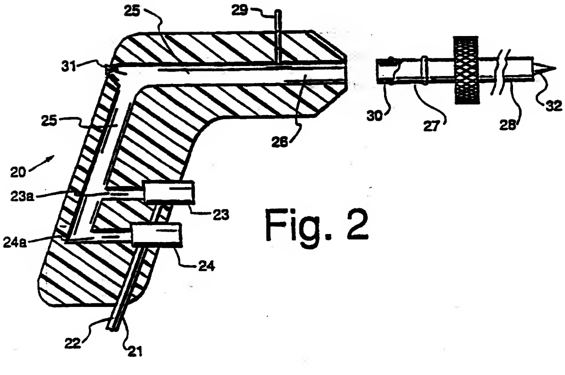
Fig. 1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32

Fig. 2

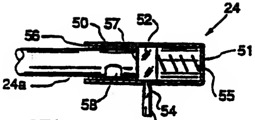

Fig. 7

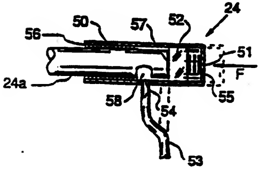

Fig. 8

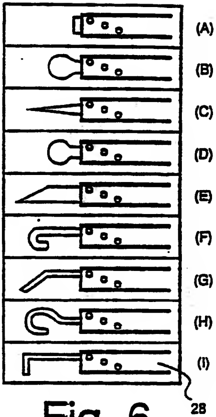

Fig. 6

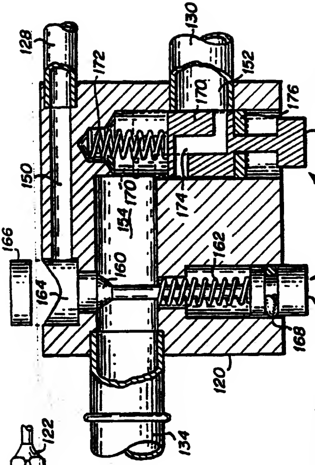

Fig.15

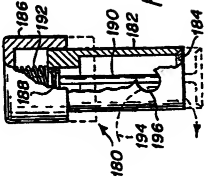

Fig.16

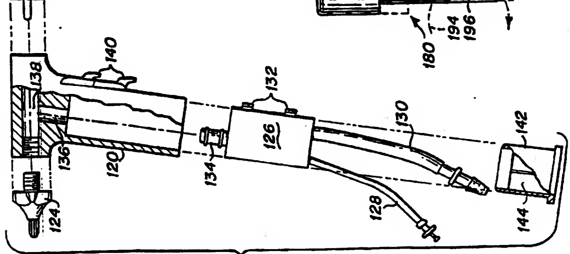

Fig.14

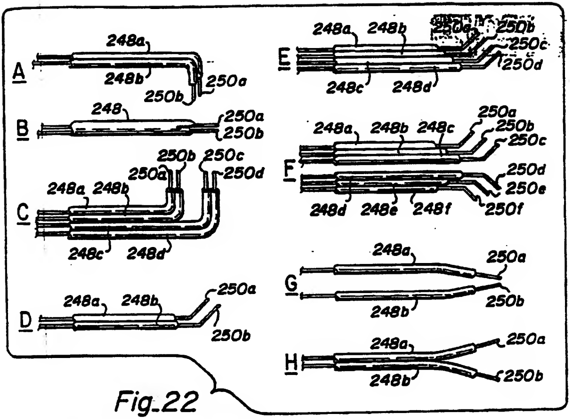

Fig_22

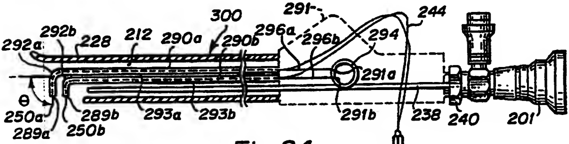

Fig_24

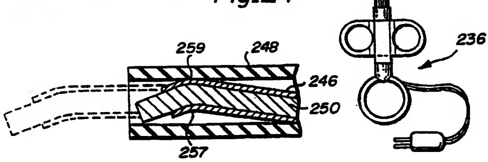

Fig_23